REMARKS

DRAWINGS

For purposes of clarity, Applicant has amended the FIGS. 1 and 2 as reflected in the Letter to the Chief Draftsman dated November 27, 2002, a copy of which is attached hereto.

SPECIFICATION

The Specification, including the Abstract, has been amended to correct obvious typographical errors. These amendments are merely formal in nature and not material to patentability.

STATUS OF CLAIMS

Claims 1-22 are pending. Claim 8 has been cancelled without prejudice or disclaimer of the subject matter. Applicant reserves the right to pursue the subject matter of this claim in this or another application. Claims 23-30 are newly added. Claims 1, 6-7, 13, 16, 17 and 19-20 have been amended to correct obvious typographical errors and not for reasons substantially related to patentability. Claim 1 has been additionally amended to recite "a sealing assembly mounted at an axial location relative to the mixer shaft, the sealing assembly having a rotating seal element that surrounds the mixer shaft and is positioned between a first stationary sealing ring and a second stationary sealing ring." Claim 11 has been similarly amended to recite "said sealing means having a rotating seal means that surrounds the mixer shaft and is positioned between a first stationary sealing means and a second stationary sealing means." Claim 6 has been amended to delete the term "structure" and recite "sealing assembly." Claim 7 has been amended to recite "a base." Claim 13 has been amended to recite " first tapered..." and "the second...." Claim 16 has been amended to recite "sealing assembly." Claim 19 has been

amended to recite "bearing means." Claim 20 has been amended to recite "supporting means, the sealing means, and the bearing means."

Accordingly, no new matter has been added by these amendments and no estoppels are intended thereby.

Reconsideration and withdrawal of the outstanding rejections is respectfully requested in view of the following remarks.

OFFICE ACTION

REJECTIONS UNDER 35 U.S.C. § 112, SECOND PARAGRAPH

(1) The 35 U.S.C. § 112, second paragraph rejection to claims 11 and 17 is not well understood by the Applicant. Claim 1 has been amended to remove the recitation of the vessel wall while claim 17 has been amended to recite "attachable." In the body of claim 17, the vessel wall is not a positively recited element of the sub-combination. To the contrary, the functional relationship that the base is attachable to the vessel wall is being claimed.

For at least these reasons, it is respectfully submitted that the § 112 rejection to claims 1 and 17 be withdrawn.

(2) Claims 6-8, 13, 16, 19 and 20 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctively claim the subject matter which Applicant regards as the invention.

As discussed in connection with the *Status of the Claims* section of this Amendment, claims 6-7, 13, 16, 19 and 20 have been amended to correct obvious typographical errors to overcome the respective § 112 rejections. Claim 8 has been cancelled. Accordingly, Applicant respectfully requests that this § 112 rejection of claims 6-7, 13, 16, 19 and 20 be withdrawn.

For at least these reasons, it is respectfully submitted that the § 112 rejection to claims 1, 6-8, 13, 16, 17, 19 and 20 be withdrawn.

REJECTIONS UNDER 35 U.S.C. § 102(b)

(1) Claims 1-8, 10-18 and 20-22 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Lake (U.S. Pat. No. 2,867,997). Applicant respectfully traverses this rejection.

Applicant notes that a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. M.P.E.P. § 2131 (quoting *Verdegall Bros. V. Union Oil Co. of California,* 814 F.2d 628, 631 (Fed. Cir. 1987)).

Claim 1, and therefore dependent claims 2-7 and 10 recite "a sealing assembly mounted at an axial location relative to the mixer shaft, the sealing assembly having a rotating seal element that surrounds the mixer shaft and is positioned between a first stationary sealing ring and a second stationary sealing ring." Claim 8 has been cancelled. The Lake patent does not disclose this aspect of the claims. The stuffing box sealing means 15 disclosed in Lake is stationary. See for example, column 2, lines 24-29 of the Lake patent.

In addition, claim 1 recites a "first bearing' and a "second bearing" that are spaced apart having separate outer and inner races that function to react to both axial and radial bending loads. To the contrary, the Lake patent only discloses a bearing apparatus having a single, common outer race and therefore cannot be considered to disclose two separate bearings. See, for example, FIGS. 1 and 2 of the Lake patent. Accordingly, Applicant respectfully requests that this § 102(b) rejection of claims 1-8 and 10 be withdrawn.

Claim 11, and therefore dependent claims 12-18 and 20, recite "said sealing means having a rotating seal means that surrounds the mixer shaft and is positioned between a first

stationary sealing means and a second stationary sealing means." As discussed in connection with the § 102(b) rejection for claims 1-8 and 10, the Lake patent fails to disclose this aspect of the claims. Furthermore, the Lake patent fails to disclose two separate bearing means as recited in the claims. Accordingly, Applicant respectfully requests that this § 102(b) rejection of claims 11-18 and 20 be withdrawn.

Claim 21, and therefore dependent claim 22, recite "using a rotating seal element that surrounds the mixer shaft and is positioned between a first stationary sealing ring and a second stationary sealing ring." Again, as discussed in connection with the § 102(b) rejection for claims 1-8 and 10, the Lake patent fails to disclose this aspect of the claims. Accordingly, Applicant respectfully requests that this § 102(b) rejection of claims 21 and 22 be withdrawn.

(2) Claims 1, 6-11 and 16-22 stand rejected rejected under 35 U.S.C. § 102(b) as being anticipated by Maynard (U.S. Pat. No. 3,887,169). Applicant respectfully traverses this rejection.

As previously discussed, a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. As previously discussed in connection to with the § 102 (b) rejections to claims 1-8, 10-18 and 20-22, claims 1 and therefore dependent claims 6-10 recite "...rotating sealing element" and "tapered roller bearings." Claim 11 and therefore dependent claims 16-20 recite a "...rotating sealing means. Claim 21 and therefore claim 22 recite a "...rotating seal element." The Maynard patent does not disclose these aspects of the claims. Claim 8 has been cancelled. Accordingly, Applicant respectfully requests that this § 102(b) rejection of claims 1, 6-11 and 16-22 be withdrawn.

(3) Claims 1-8, 10-18 and 20-22 stand rejected rejected under 35 U.S.C. § 102(b) as being anticipated by Umstattd (U.S. Pat. No. 2,034,545). Applicant respectfully traverses this rejection.

As previously described in connection with the prior § 102(b) rejections to the pending claims, independent claim 1 and therefore dependent claims 2-7 and 9-10 recite "a rotating seal element that surrounds the mixer shaft" while claim 11 and dependent claims 12-20 recite "rotating seal means." In addition, claims 21 and 22 recite "a rotating seal element." Claim 8 has been cancelled. Umstattd does not disclose any of the aforementioned recited elements and therefore does not anticipate claims 1-8, 10-18 and 20-22. Accordingly, Applicant respectfully requests that this § 102(b) rejection of claims 1-8, 10-18 and 20-22 be withdrawn.

For at least these reasons, it is respectfully submitted that the § 102(b) rejections to claims 1-22 be withdrawn.

REJECTIONS UNDER 35 U.S.C. § 103(a)

(1) Claims 9 and 19 stand rejected under 35 U.S.C. § 103 (a) as being allegedly unpatentable over Lake (U.S. Pat. No. 2,867,997) or Umstattd (U.S. Patent No. 2,034,545) in view of Blakley et al (U.S. Patent No. 5,568,975).

To establish a prima facie case of obviousness, the prior art references must teach or suggest all of the claim elements. M.P.E.P. § 2143. There must also be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the references. *Id.* Applicant respectfully submits that these criteria for obviousness have not been satisfied.

With respect to teaching or suggesting all the claim limitations, Lake and Umstattd are completely silent with respect to the recited rotating seal element and the rotating seal means of

claims 9 and 19, respectively, and thus do not disclose the claimed rotating seal element and rotating seal means.

Blakley et al. does not remedy the above-described deficiencies in Lake and Umstattd with respect to claims 9 and 19. Blakley et al. fails to disclose a rotating seal element or a rotating seal means. Accordingly, Applicant respectfully requests that this § 103 (a) rejection be withdrawn.

For at least these reasons, it is respectfully submitted that the § 103 (a) rejection to claims 9 and 19 be withdrawn.

ADDITIONAL REMARKS

Claims 23-30 have been submitted for consideration. Support for these claims can be found in the original application as filed. The references cited do not disclose removable first and second tapered bearings spaced apart to counteract radial and axial bending loads. In addition, the removable cartridge feature recited in newly added claims 28-30 is not disclosed in Lake, Maynard or Umstattd.

In view of the foregoing, reconsideration and allowance of the application are believed in order, and such action is earnestly solicited.

Should the Examiner believe that a telephone conference would expedite issuance of the application, the Examiner is respectfully invited to telephone the undersigned attorney at 202/861-1714.

Respectfully submitted,

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Attachment - Appendix

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Date: November 27, 2002

Appendix – Marked-up Version of Amendments

The specification has been amended as follows:

Please replace the paragraph located at page 7, line 8, with the following paragraph:

An outer bearing housing 32 is fastened to the seal housing base 22 by the bolt 24. The outer bearing housing 32 is connected to and retains an upper bearing 34 having an outer race 36 and an inner race 38. The outer bearing housing 32 is also connected to a lower bearing 40 having an outer race 42 and an inner race 44 as shown. The outer bearing housing 32 is thus fixed in relation to the mixing vessel flange [10] 7 and does not rotate.

Please replace the paragraphs located at page 8, lines 8 and 17 respectively, with the following two paragraphs:

In the preferred embodiment, the upper bearing 34 is a tapered roller bearing canted in the angular direction illustrated (i.e., upwardly away from the mixer shaft 12). The lower bearing 40 in this embodiment is also a tapered roller bearing canted as illustrated (i.e., downwardly away from the mixer shaft 12). The feature of angling the roller bearings 34, 40 opposite to each other provides a significant improvement over the prior art, because the bearings 34, 40 can provide improved radial and axial load handling, and further can resist bending along the length of the shaft 12 between the bearings 34, 40. This in turn provides a desirable resistance against bending along the mixer shaft 12, particularly relatively near the bearing locations, for example, at the location of the [lower seal 28] upper stationary sealing ring 31.

In the illustrated preferred embodiment, the present invention provides resistance against axial, radial, and bending movement. The use of tapered roller bearings particularly enhances

the axial restraining performance of the bearing arrangement. The tapered roller bearings also provide desirable lateral restraining ability. The provision of two sets of roller bearings, one spaced above the other in the axial direction along the mixer shaft 12, provides a restraining force at two different axial locations, thereby reacting to bending loads along the shaft. This restraining effect also tends to keep the mixer shaft 12 in a sufficiently linear condition at areas of the mixer shaft 12 relatively adjacent to the bearings. In this way, the arrangement of the bearings shown in the preferred embodiment of FIG. 1 improves the restraining ability of the bearing assembly in the area of the mixer shaft 12 near the seal assembly 28 as well. This restraining effect can reduce wear on the seal, thereby improving seal lifetime, and providing a better sealing effect during the life of the seal. A flexible coupling 18 may be used as shown to accommodate any misalignments between the coupled shafts.

Please replace the paragraphs located at page, lines 10 and 16 respectively, with the following two paragraphs:

FIG. 2 illustrates the above described components in exploded view, including the mixer shaft 12 having the lower flange 14 and the coupling 18. The housing base 22 and the seal housing top 26 that retain the seal [element] assembly 28 are shown. Also shown is the outer bearing housing 32 which retains the upper bearing 34 and the lower bearing 40 against the and inner bearing housing 46 which surrounds a portion of the mixer shaft 12.

FIG. 3 schematically depicts a bearing and seal assembly 10 as illustrated in FIGS. 1 and 2 being installed in an opening of atop wall of a mixer vessel 8, with a drive system [50] 60 having a drive shaft 20 connected to the top end of the mixer shaft 12. The lower end of the

mixer shaft 12 is connected to an impeller shaft 16 that has impellers 52 mounted thereon. In a preferred embodiment, the drive system [50] 60 is an electric motor and speed reducer.

IN THE ABSTRACT

An assembly for supporting a mixer shaft in an opening in a vessel wall [ha] having a support mounted to the vessel wall around the opening and a seal ring supported by the support that engages a circumference of the mixer shaft with a sealing contact. A first tapered roller bearing is mounted to the support that surrounds and supports the mixer shaft at one axial location thereof and a second tapered roller bearing is mounted to the support that surrounds and supports the mixer shaft at a second axial location thereof.

IN THE CLAIMS

Please amend the claims as follows:

Please amend the claims as follows:

1. (Amended) An assembly for supporting a mixer shaft in an opening in a vessel wall, the assembly comprising:

a support mounted [to the vessel wall] around the opening;

[seal mounted at an axial location relative to the mixer shaft;]

a sealing assembly mounted at an axial location relative to the mixer shaft, the sealing assembly having a rotating seal element that surrounds the mixer shaft and is positioned between a first stationary sealing ring and a second stationary sealing ring;

a first bearing mounted to the support that surrounds and supports the mixer shaft at a first axial location thereof; and

a second bearing mounted to the support that surrounds and supports the mixer shaft at a second axial location thereof.

6. (Amended) [As] An assembly according to claim 1, wherein the support [structure] comprises a first support portion that supports the [seal ring] sealing assembly and a second support portion that supports the first and second bearings.

7. (Amended) An assembly according to claim 6, wherein the first support portion comprises a housing attached to [the] a base that supports the first and second bearings.

11. (Amended) An assembly for supporting a mixer shaft in an opening in a vessel wall, the assembly comprising:

supporting means mounted [through the vessel wall] around the opening;

sealing means supported by the supporting means that engages a circumference of the mixer shaft with sealing contact, said sealing means having a rotating seal means that surrounds the mixer shaft and is positioned between a first stationary sealing means and a second stationary sealing means;

first bearing means supported by supporting means that surrounds and supports the mixer shaft at one axial location thereof; and

second bearing means supported by the supporting means that surrounds and supports the mixer shaft at a second axial location thereof.

13. (Amended) An assembly according to claim 12, wherein the first tapered roller bearing is canted at a first angle relative to an axis of the mixer shaft and [a] the second tapered roller bearing is canted at a second angle relative to the axis of the mixer shaft.

16. (Amended) An assembly according to claim 11, wherein the supporting means comprises a first support portion that supports the [seal ring] sealing assembly [and a second support portion that supports the seal ring] and a second support portion that supports the first and second bearing means.

17. (Amended) An assembly according to claim 16, wherein the first support portion comprises a base that is [attached] attachable to the vessel wall.

19. (Amended) An assembly according to claim 11, further comprising an inner bearing housing that surrounds a portion of the shaft and is mounted to the first and second bearing[s] means.

20. (Amended) An assembly according to claim 11, wherein the [support, the seal, and the bearing] supporting means, the sealing means, and the bearing means form a removable cartridge.

21. A method for supporting a mixer shaft in an opening in a vessel wall, comprising the steps of:

sealing around the circumference of the mixer shaft at a first location of the mixer shaft to prevent material from escaping the vessel around the shaft, using a rotating seal element that

surrounds the mixer shaft and is positioned between a first stationary sealing ring and a second stationary sealing ring; and

supporting the mixer shaft at [at] least second and third locations along the length of the mixer shaft to resist axial, radial, and bending loads on the shaft at the second and third locations.